

Amendment to the Claims

The Listing of Claims presented below will replace all prior versions, and listings, of claims in the application.

Listing of Claims

1. (Original) A mixture or set of sub-mixtures comprising X-mer precursors,
wherein the X-mer precursors have a minimum length of 3 nucleotides;
wherein the mixture has a minimum mixture coverage complexity of at least $56/N$ or wherein the set of sub-mixtures has a composite mixture coverage complexity of at least $56/N$, wherein N represents the number of distinct X-mer precursors in the mixture;
wherein each sub-mixture in said set has a reduced mixture coverage complexity as compared with the composite mixture coverage complexity;
wherein each sub-mixture comprises a plurality of X-mer precursors;
wherein said length is selected independently for each X-mer precursor; and
wherein the mixture or set of sub-mixtures further comprises a set of tags wherein each tag is covalently linked to at least one X-mer precursor through a cleavable linker.
2. (Original) A mixture or set of sub-mixtures comprising X-mer precursors,
wherein said X-mer precursors have a minimum length of 3 nucleotides;
wherein said mixture has a minimum mixture coverage complexity of at least $56/N$ or wherein said set of sub-mixtures has a composite mixture coverage complexity of at least $56/N$, wherein N represents the number of distinct X-mer precursors in the mixture;
wherein each sub-mixture in said set has a reduced mixture coverage complexity as compared with the composite mixture coverage complexity;
wherein each sub-mixture further comprises a plurality of X-mer precursors;
wherein said length is selected independently for each X-mer precursor;

wherein the mixture or set of sub-mixtures further comprises a set of tags wherein each tag is covalently linked to at least one X-mer precursor through a cleavable linker; and

wherein said X-mer precursors have a determined isotopic composition.

3. (Original) The mixture or set of sub-mixtures of claim 1 or 2 wherein said mixture has a mixture coverage complexity of at least about $1/2$ when said mixture contains at least 128 discrete X-mers, or wherein said set of sub-mixtures has a composite mixture coverage complexity of at least about $1/2$ when said set of sub-mixtures contains at least 128 discrete X-mers.
4. (Original) The mixture or set of sub-mixtures of claim 1 or 2, wherein said mixture has a mixture coverage complexity of at least about $1/4$ when said mixture contains at least 256 discrete X-mers, or wherein said set of sub-mixtures has a composite mixture coverage complexity of at least about $1/4$ when said set of sub-mixtures contains at least 256 discrete X-mers.
5. (Original) The mixture or set of sub-mixtures of claim 1 or 2, wherein said mixture has a mixture coverage complexity of at least about $1/8$ when said mixture contains at least 512 discrete X-mers, or wherein said set of sub-mixtures has a composite mixture coverage complexity of at least about $1/8$ when said set of sub-mixtures contains at least 512 discrete X-mers.
6. (Original) The mixture or set of sub-mixtures of claim 1 or 2, wherein nucleotide sequences of the precursors of said mixture or set of sub-mixtures are known.
7. (Currently amended) A mixture or set of sub-mixtures comprising X-mer precursors, wherein the X-mer precursors have a minimum length of 3 nucleotides; wherein the mixture has a minimum mixture coverage complexity of at least $56/N$ or wherein the set of sub-mixtures has a composite mixture coverage

complexity of at least $56/N$, wherein N represents the number of distinct X-mer precursors in the mixture;

wherein each sub-mixture in said set has a reduced mixture coverage complexity as compared with the composite mixture coverage complexity;

wherein each sub-mixture comprises a plurality of X-mer precursors;

wherein said length is selected independently for each X-mer precursor;

wherein the mixture or set of sub-mixtures further comprises a set of tags wherein each tag is covalently linked to at least one X-mer precursor through a cleavable linker; and ~~The mixture or set of sub-mixtures of claim 1 or 2,~~

wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is between approximately 10-100,000.

8. (Currently amended) The mixture or set of sub-mixtures of claim 7 or 81 ~~1 or 2~~, wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is between approximately 20-20,000.
9. (Currently amended) The mixture or set of sub-mixtures of claim 7 or 81 ~~1 or 2~~, wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is between approximately 20-10,000.
10. (Currently amended) The mixture or set of sub-mixtures of claim 7 or 81 ~~1 or 2~~, wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is between approximately 20-5,000.
11. (Currently amended) The mixture or set of sub-mixtures of claim 7 or 81 ~~1 or 2~~, wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is between approximately 50-1000.
12. (Currently amended) A mixture or set of sub-mixtures comprising X-mer precursors, wherein the X-mer precursors have a minimum length of 3 nucleotides; wherein the mixture has a minimum mixture coverage complexity of at least $56/N$ or wherein the set of sub-mixtures has a composite mixture coverage

complexity of at least $56/N$, wherein N represents the number of distinct X-mer precursors in the mixture;

wherein each sub-mixture in said set has a reduced mixture coverage complexity as compared with the composite mixture coverage complexity;

wherein each sub-mixture comprises a plurality of X-mer precursors;

wherein said length is selected independently for each X-mer precursor;

wherein the mixture or set of sub-mixtures further comprises a set of tags

wherein each tag is covalently linked to at least one X-mer precursor through a cleavable linker; and ~~The mixture or set of sub-mixtures of claim 1 or 2,~~

wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is greater than a mass number complexity (MNC) of a natural equivalent of the mixture or set of sub-mixtures, wherein the natural equivalent of the X-mer precursors are extended by one nucleotide, and wherein the number of tags in the set of tags is less than or equal to a number of X-mer precursors in the mixture or set of sub-mixtures.

13. (Currently amended) The mixture or set of sub-mixtures of claim 12 or 82 ~~1 or 2~~, wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is greater than 75% of a mass number complexity (MNC) of a natural equivalent of mixture or set of sub-mixtures, wherein the natural equivalent of the X-mer precursors are extended by one nucleotide, and wherein the number of tags in the set of tags is less than or equal to a number of X-mer precursors in the mixture or set of sub-mixtures.
14. (Currently amended) A mixture or set of sub-mixtures comprising X-mer precursors,
wherein the X-mer precursors have a minimum length of 3 nucleotides;
wherein the mixture has a minimum mixture coverage complexity of at least $56/N$ or wherein the set of sub-mixtures has a composite mixture coverage complexity of at least $56/N$, wherein N represents the number of distinct X-mer precursors in the mixture;
wherein each sub-mixture in said set has a reduced mixture coverage complexity as compared with the composite mixture coverage complexity;

wherein each sub-mixture comprises a plurality of X-mer precursors;
wherein said length is selected independently for each X-mer precursor;
wherein the mixture or set of sub-mixtures further comprises a set of tags
wherein each tag is covalently linked to at least one X-mer precursor through a
cleavable linker; and ~~The mixture or set of sub-mixtures of claim 1 or 2,~~

wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is at least 0.5% of a number of X-mer precursors in the mixture or set of sub-mixtures, and less than or equal to the number of X-mer precursors in the mixture or set of sub-mixtures.

15. (Currently amended) The mixture or set of sub-mixtures of claim 14 or 83 ~~1 or 2~~, wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is at least 1% of a number of X-mer precursors in the mixture or set of sub-mixtures, and less than or equal to the number of X-mer precursors in the mixture or set of sub-mixtures.

16. (Currently amended) The mixture or set of sub-mixtures of claim 14 or 83 ~~1 or 2~~, wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is at least 10% of a number of X-mer precursors in the mixture or set of sub-mixtures, and less than or equal to the number of X-mer precursors in the mixture or set of sub-mixtures.

17. (Currently amended) The mixture or set of sub-mixtures of claim 14 or 83 ~~1 or 2~~, wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is at least 25% of a number of X-mer precursors in the mixture or set of sub-mixtures, and less than or equal to the number of X-mer precursors in the mixture or set of sub-mixtures.

18-73. (Cancelled)

74. (Original) A kit for carrying out a method of analyzing a target nucleic acid sequence, comprising:

- a. the mixture or the set of sub-mixtures of claim 1; and
 - b. an enzyme having a nucleotide polymerase activity.
75. (Original) The kit of claim 74, further comprising a multiplicity of nucleotides selected from the group consisting of natural chain-terminating triphosphates and modified chain-terminating triphosphates.
76. (Original) The kit of claim 74, further comprising chain-terminating nucleotides with an affinity label for purification of nucleic acids.
77. (Original) A kit for carrying out a method of analyzing a target nucleic acid sequence comprising:
- a. the mixture or the set of sub-mixtures of claim 1; and
 - b. a DNA ligase.
78. (Original) A kit for carrying a method of analyzing a target nucleic acid sequence, comprising:
- a. the mixture or the set of sub-mixtures of claim 1; and
 - b. a condensing agent.
79. (Original) A kit for carrying out a method of analyzing a target nucleic acid sequence having a 3'-end and a 5'-end, comprising:
- a. the mixture or the set of sub-mixtures of claim 1;
 - b. a DNA ligase; and
 - c. an array comprising:
 - (a) a surface; and
 - (b) a multiplicity of nucleic acid sequence probes comprising:
 - (i) a nucleic acid attached to said surface, wherein the nucleic acid has a terminal 3'-hydroxyl end and wherein the 5' end is directly or indirectly attached to said surface.

80. (Original) A kit for carrying out a method of analyzing a target nucleic acid sequence having a 3'-end and a 5'-end, comprising:

- a. the mixture or the set of sub-mixtures of claim 1;
- b. a condensing agent; and
- c. an array comprising:
 - (a) a surface; and
 - (b) a multiplicity of nucleic acid sequence probes comprising:
 - (i) a nucleic acid attached to said surface, wherein the nucleic acid has a terminal 3'-hydroxyl end and wherein the 5' end is directly or indirectly attached to said surface.

81. (New) A mixture or set of sub-mixtures comprising X-mer precursors, wherein said X-mer precursors have a minimum length of 3 nucleotides; wherein said mixture has a minimum mixture coverage complexity of at least 56/N or wherein said set of sub-mixtures has a composite mixture coverage complexity of at least 56/N, wherein N represents the number of distinct X-mer precursors in the mixture;

wherein each sub-mixture in said set has a reduced mixture coverage complexity as compared with the composite mixture coverage complexity;

wherein each sub-mixture further comprises a plurality of X-mer precursors;

wherein said length is selected independently for each X-mer precursor;

wherein the mixture or set of sub-mixtures further comprises a set of tags wherein each tag is covalently linked to at least one X-mer precursor through a cleavable linker;

wherein said X-mer precursors have a determined isotopic composition; and

wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is between approximately 10-1,000,000.

82. (New) A mixture or set of sub-mixtures comprising X-mer precursors, wherein said X-mer precursors have a minimum length of 3 nucleotides;

wherein said mixture has a minimum mixture coverage complexity of at least $56/N$ or wherein said set of sub-mixtures has a composite mixture coverage complexity of at least $56/N$, wherein N represents the number of distinct X-mer precursors in the mixture;

wherein each sub-mixture in said set has a reduced mixture coverage complexity as compared with the composite mixture coverage complexity;

wherein each sub-mixture further comprises a plurality of X-mer precursors;

wherein said length is selected independently for each X-mer precursor;

wherein the mixture or set of sub-mixtures further comprises a set of tags wherein each tag is covalently linked to at least one X-mer precursor through a cleavable linker;

wherein said X-mer precursors have a determined isotopic composition; and

wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is greater than a mass number complexity (MNC) of a natural equivalent of the mixture or set of sub-mixtures, wherein the natural equivalent of the X-mer precursors are extended by one nucleotide, and wherein the number of tags in the set of tags is less than or equal to a number of X-mer precursors in the mixture or set of sub-mixtures.

83. (New) A mixture or set of sub-mixtures comprising X-mer precursors,
- wherein said X-mer precursors have a minimum length of 3 nucleotides;
- wherein said mixture has a minimum mixture coverage complexity of at least $56/N$ or wherein said set of sub-mixtures has a composite mixture coverage complexity of at least $56/N$, wherein N represents the number of distinct X-mer precursors in the mixture;
- wherein each sub-mixture in said set has a reduced mixture coverage complexity as compared with the composite mixture coverage complexity;
- wherein each sub-mixture further comprises a plurality of X-mer precursors;
- wherein said length is selected independently for each X-mer precursor;
- wherein the mixture or set of sub-mixtures further comprises a set of tags wherein each tag is covalently linked to at least one X-mer precursor through a cleavable linker;

wherein said X-mer precursors have a determined isotopic composition; and
wherein a number of tags in the set of tags distinguishable by mass
spectrometry after cleavage of the linkers is at least 0.5% of a number of X-mer
precursors in the mixture or set of sub-mixtures, and less than or equal to the number
of X-mer precursors in the mixture or set of sub-mixtures.